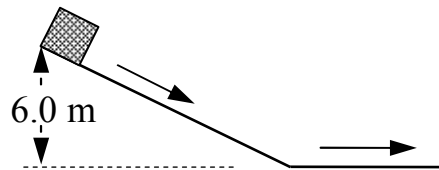


Example #16: An object of mass 12 kg starts from rest and slides down a ramp that has a vertical drop of 6.0 m. Heat generated as the object moves down the ramp is 310 J.

- How fast will the object be going at the bottom of the ramp?
- If the object *then* slides along a horizontal surface of $\mu = 0.25$, how far will it travel before coming to a rest?



$$\text{a) at top, } E_t = E_p = 12(9.8)(6) \\ = 705.6 \text{ J}$$

$$\text{at bottom, } E_t = E_k + \text{heat} \\ 705.6 = \frac{1}{2}(12)v^2 + 310$$

$$\boxed{v = 8.1 \text{ m/s}}$$

$$\text{b) } F_f = \mu F_n = \mu F_g = .25(12)(9.8)$$

$$F_f = 29.4 \text{ J}$$

→ along horizontal surface, remaining
 $E_k = 705.6 - 310 = 395.6 \text{ J}$ → will go up in heat

$$\text{Heat generated: } W = F_f d$$

$$395.6 = 29.4 d$$

$$\boxed{d = 13 \text{ m}}$$